

Exercise 7

Classify the following equations as Fredholm, or Volterra, linear or nonlinear, and homogeneous or inhomogeneous

$$u'(x) = 1 + \int_0^1 (x-t)u(t) dt, u(0) = 1$$

Solution

This is a Fredholm integro-differential equation because both limits of integration are constant. It is linear because the exponents of u and u' are 1 wherever they appear in the equation. It is inhomogeneous because of 1 on the right side in front of the integral.